

IN THE SPECIFICATION:

Please replace paragraphs 39, 44, 53, and 66 through 68 of the Specification with the text enclosed in clean form herein below pursuant to 37 C.F.R. §§ 1.121(b)(1)(i) and 1.121(b)(1)(ii). Also attached is a marked-up version of the same paragraphs, as amended herein, pursuant to 37 C.F.R. § 1.121(b)(1)(iii).

[0039] The data are preferably formatted in an STL type computer file, STL being a standardized format employed by a majority of manufacturers of stereolithography equipment. Fortunately, the format has been adopted for use in many solid-modeling CAD programs, translation from another internal geometric database format is often unnecessary. In the particular case where the apparatus 10 is to be used for applying only a single layer 50 of uniform thickness, the program may be somewhat simplified.

[0044] Referring now to both FIGs. 1 and 2, data from the STL files resident in computer 12 is manipulated to form layer 50 one sub-layer 51 at a time on each die 52 or other substrate. Accordingly, where layer 50 is formed of a plurality of individually formed sub-layers 51, the data mathematically representing layer 50 are divided into subsets, each subset representing a slice or sub-layer 51 of layer 50. This is effected by mathematically sectioning the 3-D CAD model into a plurality of horizontal sub-layers 51, a "stack" of such sub-layers 51 representing layer 50. Each slice or sub-layer 51 may be from about 0.0001 to about 0.0300 inch thick. As mentioned previously, a thinner slice promotes higher resolution by enabling better reproduction of fine vertical surface features of sub-layer 51. Where a "recoater" blade 32 is employed as described below, the interposition of base supports precludes inadvertent contact of blade 32 with the surface 54 of wafer 60 or the surface of another substrate.

[0053] A small portion of wafer 60 is shown in FIG. 3, having a plurality of rectangular dice 52A, 52B, 52C, 52D, 52E and 52F, etc., with die edges 48 separated by streets 44 in the X and Y directions. FIGS. 3 and 4 illustrate a die 52 prior to the formation of a protective layer 50 thereon. For the sake of simplicity, other details of the surface 56 of die 52 are not shown.

[0066] It should be noted that the laser treatment may be carried out to form a boundary 58 which adheres to the surface (e.g., die surface 56) of the substrate and the sub-layer 51 within the boundary is lightly cured to form a semi-solid "skin" which encloses liquid material 16. Trapped, unconsolidated material will eventually cure due to the cross-linking initiated in the outwardly adjacent photopolymer. The cure of sub-layer 51 may be

subsequently accelerated by broad-source UV radiation in a chamber, or by thermal cure in an oven. In this manner, an extremely thick protective layer 50 may be formed in minimal time within apparatus 10.

[0067] As illustrated in FIG. 10, the method of the invention may be adapted to form layers 50 on dice 52 (e.g., LOC dice) already mounted on lead frames 66. In the example of FIG. 10, a series of dice 52 have active surfaces 64 secured to lead frames 66 of strip 80 and electrically connected thereto, such as by wire bonds 68, thermocompression bonding, TAB bonding, or otherwise as known in the art. A layer 50 of semi-solid material formed from material 16 may be formed on any particular portion of the active surface 64 or back side 82 (including lead frame 66) of each die 52, for protection, insulation or other purpose. In the example of FIG. 10, a layer 50 of semi-solid material is to be formed on portions of the active surface 64 of a die 52 suspended from lead frame strip 80 and supported on platform 20. Layer 50 surrounds lead fingers of the lead frame 66 and provides attachment thereof to die 52. As already described, a film of liquid material 16 is formed atop the active surface 64 and lead frame 66. A narrow beam 28 of UV laser radiation is precisely scanned by stereolithographic means over particular areas to partially cure the material 16 to form a semi-solid layer 50. The lead frame strip 80 is then repositioned to place the next sequential die 52 in place for formation of layer 50. It should be noted that the process may be conducted without an underlying platform 20 provided that the die 52 and lead frame strip 80 are securely joined and a vertical position of the combination may be precisely attained and retained without underlying support.

[0068] In another variation, shown in the example of FIG. 11, a narrow sub-layer 51 defining an attachment 84 of semi-solid material may be first formed with the dice 52 positioned atop the lead frame strip 80, this layer formed adjacent the periphery of the dice 52 to join outer portions of the lead fingers to the dice. Attachment 84 may be formed by submerging the lead frame strip and die to a level providing the desired reinforcement member and partially curing by laser radiation. Following this step, the lead frame strip 80 may then be inverted and a layer 50 (not shown) applied to the active surface 64 of lead frame 66 side of the die 52, electrically connected thereto, such as by wire bonds 66, as indicated above.